first attached to the right side of the transverse colon and subsequently to the left side, the intermediate space being filled up later. The two earlier stages are represented in lower mammals; in *Trichosurus* the omentum is attached to the colon only on the extreme right of the transverse bend, and in *Orycteropus* and *Hyrax* the attachment is double, to the early part of the colon and to a more distal region—the intervening tract being free of the omentum.

(13) The view, deducible from previous investigations, that four stages of advancing complexity are shown in the Mammalian gut, is strengthened by fresh facts; the Lemurs are shown to be the only group in which all but one of these four stages occur.

4. The Armour of the Extinct Reptiles of the Genus *Pareiasaurus*. By H. G. Seeley, F.R.S., F.Z.S., King's College, London.

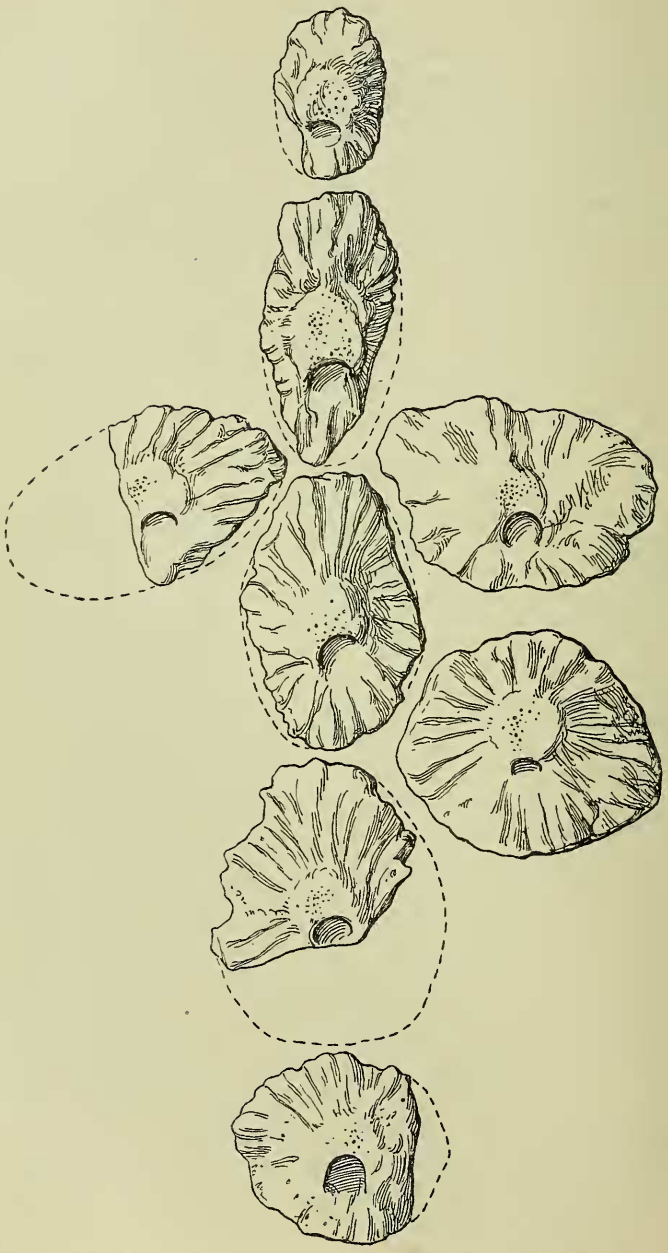
[Received April 29, 1908.]

(Text-figures 125–129.)

In "Further Observations on *Pareiasaurus*," Phil. Trans. B. Royal Society, 1892, I gave a short account of the dermal armour, pp. 345–6. It is limited to the dorsal region, and is figured in plate 17, and indicated by the letters *ds* in the description of the plate, p. 368. The scutes are only known in this example of *Pareiasaurus baini*, extracted from the rock by myself. They were originally covered with matrix. Their existence was not suspected, and it is possible that the more anterior scutes may have been partly lost in removing the intractable rock; and those seen in the British Museum specimen were preserved by great skill in chiselling. The ossifications are flat and inconspicuous, except where the lateral plates overhang the neural spines.

In the small figure of the skeleton given in the 'Story of the Earth,' 1895, text-fig. 18, p. 126, the scutes were made more evident by dark outlines. Each scute is about 2 inches wide by $1\frac{3}{4}$ inch long. There is a median row extending down the back, which as preserved now rests upon the summits of the neural spines of the dorsal vertebræ and the interspaces between them. There are also two lateral rows, one of which flanks each side of the median row. These are arranged symmetrically in pairs, and extend transversely outward from their contact with the median row, but alternate with them by being placed at the junction between each two median scutes. The lateral scutes in *Pareiasaurus baini* are not flat but convexly curved as they extend outward, giving some support to the idea that this armour formed an elevated ridge on the back. In the present condition of the specimen this armour is only seen on seven consecutive later dorsal vertebræ and one or two earlier dorsals; and there is no evidence that it was present over more than twelve vertebræ.

Text-fig. 125.



Dorsal armour of *Pareiasaurus steenkampensis*; the scutes are arranged as in *P. baini*.

Therefore the restorations which show elevated scutes extending from the skull to the extremity of the tail, or three parallel rows of scutes on the back entirely separated, and those which show the body clustered over with rows or groups of scutes, are entirely imaginary, for the only evidence for the armour is the skeleton in the British Museum.

Some writers in this country, and in Germany, have denied that any armour at all is present. The British Museum skeleton is sufficient evidence of its characteristics. If it had been more extensively developed over the body it is improbable that it would have escaped detection in the careful removal of the matrix during the two years that I watched the development of the skeleton; and there is no reason to modify in any way the original description or figure.

That evidence may now be added to by a short account of specimens of scutes already referred to (*l. c.* pp. 315, 346) as collected by Mr. J. van Renen, R.N., at Steenkamps Poort, south of Fraserberg. I had just collected the *Pareiasaurus* and was passing north, when this gentleman showed me a series of badly preserved bones collected as weathered, and invited me to select any example which might be necessary. I had no doubt they were Pareiasaurian, though the essential characteristic parts of the skeleton were not preserved. I accepted one caudal vertebra, and a series of nine scutes as giving evidence of armour, which I had not seen at that time.

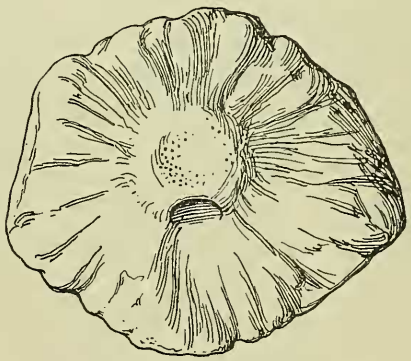
The scutes are free from matrix, vary greatly in size, and belong to a different species from *P. baini*, which I propose to indicate on the evidence of these scanty materials as *Pareiasaurus steenkampensis*. The scutes can only be supposed to have been arranged as in *P. baini*; that is, in a single longitudinal row down the back, with lateral scutes directed transversely outward on each side from the union between each two successive scutes of the linear series. All the ossifications are irregular, and about half are broken (text-fig. 125). It is possible that all of those preserved belong to the median series only, for none show the curved convex forms of the lateral scutes of *P. baini*, and this difference may be a specific character. Four or five can be recognised as median by their elongated forms; and the remainder may be median or lateral, if lateral scutes were present, as I think the evidence of the surface characters indicates. They are smooth on the under side, marked on the upper surface with a central conical blunt boss, from which numerous short grooves radiate irregularly to the margin, which is commonly thick and rough, as though the plates were imbedded in the skin. Behind the central boss, which is more or less flattened above, and less than half an inch in diameter, is a distinct pit nearly as wide, which is seen in half a dozen examples. The radiating ridges are more or less pitted, and all the surfaces, superior and inferior, are pierced with fine vascular markings. The largest plates are about $2\frac{1}{4}$ inches long by $1\frac{1}{2}$ inch wide, and fully half an inch thick at the central boss. In form they are irregularly ovate; some appear to be transversely ovate and have the central boss less conspicuous.

The smallest is $1\frac{4}{10}$ inch long, 1 inch wide, and half an inch thick. Its inferior surface is slightly convex, and the external margin is a sharp edge. The central part of the plate being occupied by the boss, the radiating ornament is very short and is a marginal fimbriation.

The second plate, slightly broken in front, is $2\frac{1}{4}$ inches long as preserved, and just over an inch wide in front of the boss, but is narrower posteriorly, though the lateral margins are weathered. The boss, $\frac{6}{10}$ inch in diameter, is shield-shaped, its hinder border being concave, with the excavation of the pit behind it. The substance of the plate is fully $\frac{1}{4}$ inch thick, both in front and behind the boss. The radiating ornament is chiefly seen anteriorly, and is irregularly pitted and corrugated. The convexity of the base made the lateral margin sharp, but the edge is almost removed by weathering.

The third plate is an elongated irregular pentagon with the base in front, about as long as the second plate, but wider. It is an inch and a half wide as preserved, but the margin appears to be worn. The boss is somewhat smaller but not less elevated, and the excavation of the pit behind it gives the aspect of a posterior position. The radiating ornament is similarly irregular, and like that on the second plate; but the base also develops in a less degree some short-ribs, especially towards the hinder margin.

Text-fig. 126.



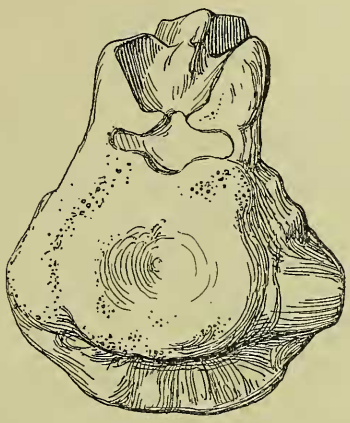
Dorsal scute of *Pareiasaurus steenkampensis*.

The fourth and fifth median plates are both imperfect. The central boss is rather less elevated, but the posterior pit continues to be a marked characteristic.

Of the remaining plates, three are wider than long on the hypothesis that the pit below the central boss is always posterior in position; and these ossifications are regarded as being placed laterally. They are rather large plates, like the lateral plates in

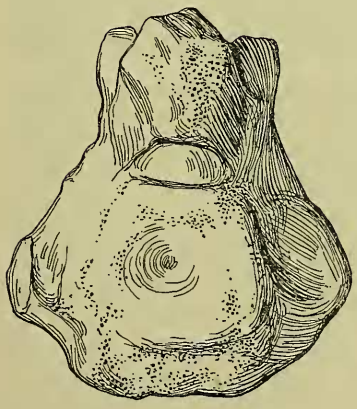
P. baini, and may have been in lateral contact with each other (text-fig. 126). The best preserved is thick at the margin, concave on

Text-fig. 127.



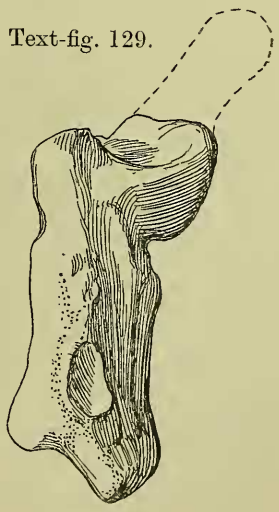
Anterior aspect.

Text-fig. 128.



Posterior aspect.

Text-fig. 129.



Lateral aspect.

Anterior, posterior, and lateral views of caudal vertebra of *Pareiasaurus steenkampensis*.

the under side. They may have been inclined obliquely backward. Their external surfaces have the same type or ornament as the

median plates. The last specimen is a fragment about 2 inches wide and half an inch thick at the margin, much thinner at the fracture, and without indication of boss or pit, so that its position cannot be located.

We can only regret the imperfections of this evidence of dermal armour, but when I saw the remains they had already been removed for some time from the rock, and it is certain that they would have been carried away by the torrential drainage in the wet season, but for the interest taken by Mr. Van Renen in their preservation.

This armature differs from that of *Pareiasaurus baini*, first in the elongated form of the median scutes, secondly in the presence of the central truncated boss with the depression behind it, and thirdly in the radiated ornament—features which are absent from *Pareiasaurus baini*. In that species the anterior median scutes appear to be subcircular, or subquadrate, with a few circular vascular openings or small pits; but in the later plates no ornament is recognised, and the plates appear to be thinner and arched outward.

The caudal vertebra is from a position between the fifth and tenth in the tail. This early position is indicated by the transverse width of the anterior face of the centrum exceeding its vertical depth (text-fig. 127); by the strong vertically compressed lateral ridges above the transverse processes for the caudal ribs, which are directed outward and slightly downward; by the large size of the transverse posterior facet for the chevron-bone, which gives the centrum the aspect of being obliquely crushed from front to back (text-fig. 129); and by the vertical position of the prezygapophyses, with the facets looking inward and upward (text-fig. 127).

When this centrum is compared with the earlier tail-vertebræ of *Pareiasaurus baini* the centrum is shorter from front to back, for it only measures one inch; and in the species referred to, the measurement is always longer when the anterior face of the centrum is wider than deep. The neural canal is smaller (text-fig. 128), as in later caudals of *Pareiasaurus baini*. These differences would indicate a shorter tail with less lateral movement.

The neural arch is not distinctive. The neural spine is broken away, but its base has the usual triangular form. The anterior articular face of the centrum is roughly hexagonal with the margin slightly rounded, and a moderate central concavity. It is $1\frac{8}{10}$ inch wide and $1\frac{1}{2}$ inch deep. The posterior face is rather smaller and rather more concave. It is roughly four-sided, with the lateral margins approximating superiorly (text-fig. 128). It is $1\frac{1}{10}$ inch deep, $1\frac{7}{10}$ wide above the chevron articulation, and 1 inch wide on the neural canal. The oblique surface for the articulation of the chevron-bone measures half an inch from front to back, and extends over the width of the vertebræ which it truncates.